

PATENT

Amendments to the Claims

Following is a complete set of claims as amended with this Response. This complete set of claims excludes cancelled claims 16-33.

1. (Previously Presented) A method for controlling a patient's heart rate, comprising:

transvenously positioning a vagal electrode proximate to the patient's right vagus nerve near the patient's cardiac branch;  
positioning an atrial electrode in the patient's atrium;  
detecting the patient's atrial rate; and  
delivering stimulation pulses to the vagal electrode when a fast atrial rate is detected, the stimulation pulses being delivered at a level that reduces the atrial rate to a normal operating range.

2. (Original) The method of claim 1, wherein the delivering step comprises:  
adjusting the level of stimulation pulses so that the atrial rate decreases to a predetermined lower atrial rate.

3. (Original) The method of claim 2, wherein adjusting the level of stimulation pulses comprises:

adjusting the level of stimulation pulses so that the atrial rate decreases to within a normal range.

4. (Original) The method of claim 2, wherein adjusting the level of stimulation pulses comprises:

adjusting the level of stimulation pulses so that the atrial rate decreases to substantially half of the detected fast atrial rate.

PATENT

5. (Original) The method of claim 2, wherein adjusting the level of stimulation pulses comprises:

adjusting at least one of amplitude, pulse width and frequency.

6. (Previously Presented) A method for controlling a patient's heart rate, comprising:

positioning a vagal electrode proximate to the patient's right vagus nerve near the patient's cardiac branch;

positioning an atrial electrode in the patient's atrium;

detecting the patient's atrial rate; and

delivering stimulation pulses to the vagal electrode when a fast atrial rate is detected, the stimulation pulses being delivered at a level that reduces the atrial rate to a normal operating range;

wherein the delivering step comprises adjusting the level of stimulation pulses so that the atrial rate decreases to a predetermined lower atrial rate;

wherein adjusting the level of stimulation pulses comprises adjusting at least one of amplitude, pulse width and frequency; and

wherein adjusting of the level of stimulation pulses further comprises:

testing a plurality of amplitude, pulse width and frequency combinations;

recording current drain for the plurality of amplitude, pulse width and frequency combinations;

determining at least one combination of amplitude, pulse width and frequency that reduces current drain; and

delivering the stimulation pulses to the vagal electrode at a level that reduces the atrial rate to the predetermined lower rate while reducing current drain.

PATENT

7. (Previously Presented) A method for controlling a patient's heart rate, comprising:

positioning a vagal electrode proximate to the patient's right vagus nerve near the patient's cardiac branch;

positioning an atrial electrode in the patient's atrium;

detecting the patient's atrial rate; and

delivering stimulation pulses to the vagal electrode when a fast atrial rate is detected, the stimulation pulses being delivered at a level that reduces the atrial rate to a normal operating range;

wherein the delivering step comprises adjusting the level of stimulation pulses so that the atrial rate decreases to a predetermined lower atrial rate;

wherein adjusting the level of stimulation pulses comprises adjusting at least one of amplitude, pulse width and frequency; and

wherein adjusting of the level of stimulation pulses further comprises:

varying a plurality of amplitude, pulse width and frequency combinations to determine whether varying degrees of lower atrial rates can be achieved;

recording corresponding atrial rates for the plurality of amplitude, pulse width and frequency combinations; and

selecting a particular amplitude, pulse width and frequency combination that corresponds to the predetermined lower atrial rate.

8. (Original) The method of claim 2, further comprising:

positioning a ventricular electrode in the patient's ventricle;

monitoring A-V conduction intervals; and

wherein the delivering step comprises delivering stimulation pulses at a level that does not cause A-V dissociation.

PATENT

9. (Original) The method of claim 8, wherein the adjusting step further comprises:

determining a plurality of operating parameter combinations that do not cause A-V dissociation, each combination including a stimulation pulse amplitude, frequency and pulse width; recording the resultant heart rate reduction for each combination; and wherein the delivering comprises delivering the stimulation pulses to the vagal electrode using the operating parameter combination that substantially achieves the predetermined lower atrial rate.

10. (Original) The method of claim 8, wherein the adjusting of the level of stimulation pulses further comprises:

recording current drain for the plurality of operating parameter combinations that do not cause A-V dissociation; and wherein the delivering comprises delivering the stimulation pulses to the vagal electrode using the operating parameter combination that reduces the atrial rate without A-V dissociation and reduces current drain.

11. (Original) The method of claim 1, further comprising:

periodically discontinuing delivering of the stimulation pulses to the vagal electrode; testing to determine if the atrial rate has returned to a normal range; disabling the delivery of the stimulation pulses to the vagal electrode when the atrial rate is in a normal range; and continuing the delivery of the stimulation pulses to the vagal electrode when the fast atrial rate is still present.

PATENT

12. (Previously Presented) A method for controlling a patient's heart rate, comprising:

positioning a vagal electrode proximate to the patient's right vagus nerve near the patient's cardiac branch;

positioning an atrial electrode in the patient's atrium;

detecting the patient's atrial rate; and

delivering stimulation pulses to the vagal electrode when a fast atrial rate is detected, the stimulation pulses being delivered at a level that reduces the atrial rate to a normal operating range;

wherein the positioning comprises positioning the vagal electrode in the right azygos vein.

13. (Original) The method of claim 12, wherein the positioning the vagal electrode in the right azygos vein comprises deploying an expandable vagal electrode configured to make contact with tissue proximate to the vagus nerve.

14. (Previously Presented) A method for controlling a patient's heart rate, comprising:

positioning a vagal electrode proximate to the patient's right vagus nerve near the patient's cardiac branch;

positioning an atrial electrode in the patient's atrium;

detecting the patient's atrial rate; and

delivering stimulation pulses to the vagal electrode when a fast atrial rate is detected, the stimulation pulses being delivered at a level that reduces the atrial rate to a normal operating range;

wherein the positioning comprises positioning the vagal electrode in the Superior Vena Cava (SVC) near the right cardiac branch.

PATENT

15. (Original) The method of claim 14, wherein the positioning the vagal electrode in the SVC comprises deploying an expandable vagal electrode configured to make contact with tissue proximate to the vagus nerve and the right cardiac branch.

16-33. (Cancelled)